EXHIBIT D

State of Utah

Coal Regulatory Program

Coal Hollow
C/025/0005
Alton Coal Development, LLC
Technical Analysis
October 15, 2009

Findings:

The application meets the Geologic Resource Information requirements.The Applicant will be required to monitor for selenium where water leaves the minesite, during operational and reclamation phases.

HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

Analysis:

Water Rights

Water rightsof springs and surface claims are described in Section 731.800 of the PAP and illustrated in Table 7-12. The applicant provides information in Appendix 7-3 and identifies the locations on Drawing 7-3. The Division conducted a search of the water rights in the Sink Valley area to ensure all water rights are being monitored.. The search found that all water rights on and adjacent to the mine have been identified by the applicant. From previous technical reviews it may appear that some water rights are not listed in Table 7-12, however water rights such as 85-363, 85-364 and 85-365 are accounted for in the stream diversion water right 85-366 filed.for thesurface and ground water rights. The applicant reported that an application had been submitted for well 85-760 (Sorensen Well), but was rejected by the Division of Water Rights. Sorensen still uses water from a spring (SP-40) , hand carried to the house.

Water Right 85-377 is not a well as mentioned in the previous TA. The site is a surface water source.on a stream. The site has been included in the water rights table.

Sampling and Analysis

The Applicant states that water sampling and analysis have been and will be conducted according to the methodology in the current edition of "Standard Methods for the Examination of Water and Wastewater" or the methodology in 40 CFR Parts 136 and 434 (Section 723).

Baseline Information

Petersen Hydrologic conducted a spring and seep survey in 2005 and 2006. UTM coordinates and basic parameters for identified sites are listed in Appendix B of Appendix 7-

1. Locations are plotted on a USGS topographic base map in that same appendix: the area covered by the primary seep and spring survey is identified on Drawing 7-1.

The Applicant has included baseline springs, wells, and stream monitoring points on Drawing 7-2. Drawing 7-10 shows the operational monitoring locations – streams, springs, and wells - that are listed in Table 7-5. Drawing 7-12 is described as showing the locations of monitoring wells in the proposed Coal Hollow permit and adjacent area, and it shows all the wells listed in Table 7-5 except for Y-98 because the drawing does not extend far enough to the northeast to include Y-98. Drawing 7-12 also includes four wells (C-6, C-8, 7-59, and Y-99) that were used in previous studies to collect baseline data on the alluvial groundwater system: data for these four wells are in the Division's database, but these wells are not included in the operational monitoring plan. Figure 12 of Appendix 7-1 also shows locations for monitoring wells, with the map symbols signifying whether the well monitors water in the coal seam or alluvium: Y-36, Y-38, and Y-45 are the coal seam wells the Applicant plans to monitor (Table 7-5). Coal-seam monitoring wells Y-39, Y-40, Y-41, Y-43, Y-49 and Y-53 and alluvium monitoring wells Y-50 and Y-62 are shown on Figure 12 but on no other map; no data for these wells have been submitted to the Division's database but potentiometric data from the 1980s are in Table 13 of Appendix 7-1.

The applicant has provided a baseline groundwater monitoring plan in Chapter 7, Section 724.100 and again in Appendix 7-1 in the Peterson Hydrologic Report (PHR). An Operation and Reclamation monitoring plan is provided in Section 730, which is based on the PHC.

The Applicant has conducted baseline monitoring for surface and ground water resources on and adjacent to the proposed mine. Table 7-1 presents the location, source and use of baseline monitoring stations. Table 7-5 shows the hydrologic monitoring locations for surface and groundwater sites, and assigns the protocols for monitoring parameters and frequencies. Table 7-4 defines the monitoring protocols. Table 7-6 identifies the list of field and laboratory parameters to be monitored quarterly at surface baseline sites. Table 7-7 identifies the list of field and laboratory parameters to be monitored quarterly at groundwater baseline sites.

Spring and stream flow data and well level information from surveys conducted in 1987 and 1988 by Utah International have been provided. The Division's database contains baseline data collected quarterly by the Applicant between February 2005 and February 2009, and data collection is ongoing. Although data are missing for some quarters at certain sites, the data are sufficient to determine seasonal variation in quality and quantity. Some of these data are submitted in Appendix 7-1, in a 2007 hydrologic report prepared by Petersen Hydrologic, LLC.

Table 7-1 identifies the location, drainage basin, geologic formation, and uses for the baseline monitoring stations. Drawing 7-1 shows the locations of springs in the proposed

Coal Hollow permit and adjacent area (The drawing does not show the location of wells as identified in 724.100 of the MRP). Table 7-5 shows the hydrologic monitoring locations for surface and groundwater sites, and it lists the protocols for monitoring parameters and frequencies identified in Table 7-4. Table 7-6 identifies the list of field and laboratory parameters the applicant proposed to monitor quarterly for surface baseline sites. Table 7-7 identifies the list of field and laboratory parameters the applicant proposed to monitor quarterly for groundwater baseline sites.

Drawing 7-1 shows two clusters of springs in the vicinity of the mine permit area, and associated with the alluvial plain of Sink Valley Wash, one is located on the northwest corner of Section 29 (Discharge Area A, Drawing 7-4) and the other is located on the northwest corner of Section 32 (Discharge Area B). The data shows that most of the springs within the proposed permit boundary emit very low flows. In the northern cluster, Spring SP-16 flows about 1 gpm, whereas, springs SP-22, SP-23, SP-24, SP-25 and SP-26 flow less than 0.1gpm. Spring SP-36 is shown on Drawing 7-1, but has not been reported to the DOGM Water Quality Database. Spring SP-14 has a flow range between 3 to 8 gpm. Springs lying just east of the mine permit area (also part of the northern cluster and Discharge Area A) consist of Springs SP-17, SP-18, SP-19 and SP-21, which flow less than 0.1 gpm. Spring SP-20 flows between 5-10 gpm and Spring SP-8 flows between 10 to 20 gpm. Only SP-8 is identified on Plate 7-2, as a baseline water monitoring station in the northern cluster. The DOGM database shows Springs SP-8, SP-16 and SP-20 have been monitored for field and laboratory parameters, although Spring SP-20 has one sample showing laboratory parameter assessment. The other springs in the northern cluster have had field parameters assessed.

Springs SP-8, SP-14, SP-16, SP-19, SP-20, SP-22, SP-24 and Sorensen Spring (SP-40), as well as, Springs SP-6, SP-8 and SP-33, located in Sink Valley below the proposed mine area, will be monitored for discharge and water quality during operational phase

Water quality in the northern cluster of springs is good. The pH ranges between 7 and 8. Conductivity is runs less than 800 umhos/cm in most samples; only Springs SP-24, SP-25 and SP-26 have conductivities in the 1,000 to 1,300 umhos/cm, which is still considered good. Heavy metal concentrations are very low. Calcium and magnesium constituents are a bit elevated.

Spring SP-6 is a low flowing alluvial spring located just outside the southern boundary of the mine permit area. SP-6 is not on Drawing 7-1, but is on Drawing 7-2. It has been monitored during several quarters during 2005, 2006 and 2007. Water quality analysis were collected and analyzed during the last three years. The water quality of SP-6 is similar to the water quality of the northern cluster springs.

The southern cluster of springs lies just south of SP-6. Springs SP-27, SP-28, SP-29 SP-30, SP-32, and SP-33. Spring SP-33 is the only spring in the cluster to be monitored for water quality and field parameters. Quarterly reporting of field and laboratory parameters was submitted to the DOGM database for the past three years for SP-33. The other springs in the cluster were monitored for field parameters. All of the springs in the cluster except Spring-33 have very low flows, which range less than 0.1 gpm. Spring 33 flows between 4 and 13 gpm. Compared to the northern cluster of springs, the springs in the southern cluster have higher pH values (from 7.35 to 9.1), accompanied by higher levels of total dissolved solids and specific conductance, reflecting the higher levels of sodium, potassium and calcium the water has picked up as it migrates down the valley. The levels of heavy metals do not increase substantially.

The Applicant describes 13 surface-water baseline monitoring points in Section 724.200.

Kanab Creek drainage

- SW-1 Kanab Creek near Alton, Utah; above proposed mining areas,SW-2 Kanab Creek below Lower Robinson Creek and below proposed mining areas,SW-3 Kanab Creek above proposed mining areas, and
- Lamb Canal irrigation ditch west of the permit area, adjacent to Kanab Creek.

Lower Robinson Creek drainage

- SW-4 Robinson Creek above proposed mining areas),
- SW-5 Lower Robinson Creek below proposed mining areas,
- SW-101 Lower Robinson Creek near proposed mining areas, andBLM-1 (Lower Robinson Creek adjacent to proposed mining areas.

Sink Valley Wash drainage

- SW-6 headwaters of unnamed tributary to lower Sink Valley Wash,
- SW-7 unnamed drainage in Section 21, T39S, R5W,
- SW-8 Swapp Hollow above proposed mining areas,
- SW-9 Sink Valley Wash below proposed mining areas,
- SW-10 unnamed tributary to Sink Valley Wash, and
- RID-1 irrigation diversion of water from Water Canyon drainage above proposed mining areas.

Erik Petersen notified the Division by e-mail on August 24, 2009 that two additional surface-water monitoring points were being added: SVWOBS-1 in the NW/4 of Section 21, T. 39 S., R. 5 W., where the northern fork of Sink Valley Wash crosses the two-track that accesses the drainage in the center of Section 21, and SVWOBS-2, located where Sink Valley Wash crosses the Swapp Hollow access road east of the Sorensen Ranch house. These have been added to the Division's database but not to maps, tables, or other locations in the MRP.

The Division received a comment that baseline water quality and quantity data were not sufficient, that one or more season's data were missing for some sites, and that data have not been collected for two years. The Division's Tech-004 is cited: Tech -004 is a guideline, not a rule, and is not enforceable. Tech-004 advises one year of baseline data, adequate to describe seasonal variation, before the submission of the application. The Applicant has met this standard.

The following table summarizes what is in the Division's electronic database for the 13 sites listed above, plus SW-I0, BLM-l, and Lamb Canal: Table 4 of Appendix 7-1 also contains discharge and water quality data for these sites (except BLM-1) and discharges for most are plotted in Figure 13 of Appendix 7-1. Although data are missing for some quarters at certain sites, the data are sufficient to determine seasonal variation in quality and quantity, and data collection is ongoing.

F - field parameters only; B - baseline parameters; NA - no access; NF - no flow														
Qtr.	**SW-1**	**SW-2**	**SW-3**	**SW-4**	**SW-5**	**SW-6**	**SW-7**	**SW-8**	**SW-9**	**SW-101**	**RID-1**	**Lambs Canal**	**BLM-1**	**SW-10**
1-87														
2-87		F												
3-87	F	F	F			F	F	F						F
4-87	F	F	F	F	F	F	F	F	F					F
1-88	F	F	F	F	F	F	F	F	F					F
1-89														F
2-05	B	B	B	B	B			B	NF	B				
2-05												F		NF
3-05	B	B	B		NF	NF		B	NF	NF		F		NF
4-05	B	B	B	NF			NF	B	NF	NF	B	NF		NF
1-06	B	NA	B			B			B	B		NA		NF
2-06	B	B	B	NF	B	NF		B	NF	NF	B	F		NF
3-06	B	B	B	NF	B	NF	NF	B	NF		B	NF		NF
4-06	B		B	NF	NF	NF	NF	B	NF	NF	B			NF
1-07	B	B	B	NF	NF	NF	NF	B	NF		B	F	F	NF
2-07				NF	NF	NF	NF		NF	NF		F	F	NF
3-07	B	B		NF		NF	NF	B	NF	NF	B	F	F	NF
4-07	B	NA	B	NF	NF	NF	NF	B	NF	NF	NF			NF
1-08		NA	B	NA	NA	B		NA	B	NF	NA		NA	F
2-08	B	B	B	NF	B	NF	NF	B	NF	NF	B	F		NF
3-08	B	B	B	NF	B	NF	NF	B	NF	NF	B	NF	F	NF
4-08	NA	NA	NA	NA	NA	NF	NA	NA	NF	NF	NA	NA	NA	NF
1-09		NA	B	NF	B	B	NF	B	NF	B	B	NF	F	NF

F - field parameters only; B - baseline parameters; NA - no access; NF - no flow														
Qtr.	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	SW-101	RID-1	Lambs Canal	BLM-1	SW-10
2-09	NA	B	B	NF	B	NF	NF	B	NF	NF	B	B	F	NF

Wells

The applicant discusses the use of wells to assess groundwater conditions in Section 724.100. The Applicant initiated a drilling program in the second quarter of 2005, which included 30 monitoring wells on and adjacent to the permit area. Investigative methods and results of the analysis of the data are described in Appendix 7-1. The information Table 7-4 gives a list of baseline monitoring wells, Y-36, Y-38 Y-45, Y-59, Y-61, Y-63, Y-99(A2), and Y-102(A5).

Drawing 7-12 shows the well locations for coal monitoring (boreholes) and alluvial monitoring wells. Drawing 7-13 shows the potentiometric levels of groundwater from water levels in the wells. Table 7-2 provides the monitoring well details (collar elevation, depth, depth to bedrock and screened interval. It is unclear in the table if the depth is from the top of the collar or surface, see deficiency written under R645-301-724.100.

The applicant provides graphs of water elevations in wells Y-36, Y-38, Y-59, Y-63, Y-98 and Y-102. There is not a graph for Y-61, however there is some discharge data in the DOGM database. The data shows Y-61 is an artesian well

Several boreholes encountered water at depths of approximately 10 – 15 feet, and flowing sands were found at 15 to 25 feet. The subsurface investigation was done during a period of high snowmelt; seasonal fluctuations of water levels of several feet are not uncommon (Appendix 5-1, Section 4.3). Drill logs, by Petersen Hydraulic and Taylor Geo-Engineering, are in Appendix B of Appendix 5-1. Geotechnical data from the boreholes are in Appendices C-1 and C-2 of Appendix 5-1. Drilling and sample locations are shown on Drawing 5-39.

The well monitoring data has provided the applicant with the information to evaluate the groundwater regime. Drilling programs identified the depth of coal, identify overlying strata and establish the level of groundwater or piezometric surface of groundwater, Drawing 7-13. Table 10, Appendix 1 identifies two wells as having artesian flow in Sink Valley, Y-61 and C5-130, in alluvial ground water system east of the permit area (Dwg. 7-12 and 7-13, Table 1 and Table 5 in Appendix 7-1). Assessment of data from wells Y-61 and Y-102 indicates groundwater quality in Sink Valley is of good quality and plentiful. The seasonal variation of water quality is established for these two wells. These reflect the groundwater moving through Sink Valley from Water Canyon, Section 21 drainage, and Swapp Canyon drainage. The applicant conducted a drawdown and recovery test on Well Y-61. The pumping rate was 334 gpm. Both springs (SP-20, SP-8, SP-14) and wells (C2-40, C3-40, C4-30 and SS-30) were monitored for drawdown. Figures 17 and 18 show graphs over the elapsed time of pumping.

Mining in the lower part of Section 30 will also destroy wells Y-102, C2, C7, C8, and C9, which lie within the Sink Valley groundwater trough. Groundwater monitoring should be established in the lower part of sink valley to monitor water quality changes during operational and reclamation phases.

Holes LR, LR45, C0, C6, Y-49 and Y-50 were drilled on the west side of the drainage divide (which is shown on Figure 19, Appendix 7-1). . Alluvial sediments are shallower in the Robinson side of the permit and the well information shows lower water levels. There is very little water quality data from wells on the Robinson Creek side of the drainage divide Since monitoring began in January 2007 through March 2009, Well C6 has been dry. Water levels were measured in Y-49 and Y-50 in 1980, 1986, and 1987, but no water quality were collected.
Since 2007, water level data has been measured at C0 and depth and baseline water quality at LR-45. Mining in this area will destroy most of these wells.

Although there is only a small amount of monitoring information on the west side of the permit area, the applicant has established the hydrologic regime in that part of the permit area Figures 21 and Drawing 7-13. The groundwater drainage divide created by the fault and dip of the beds have isolated the west and northern portion of the mine permit from the recharge areas to the west.

The piezometric surface was derived with a paucity of well data on the west and north side of the permit. The method used to derive the piezometric surface must be described.

The Applicant has identified that, in and adjacent to the proposed permit area, ground-water resources in the Tropic Shale and Dakota Formation are limited, and neither is a significant source of ground water. Information supporting this conclusion is found in Section 721. Chapter 6 and Appendix 7-1 contain information on the lithology and stratigraphy of the Tropic and Dakota strata. Bore-hole logs in Appendix 6-4 indicate strata overlying and immediately underlying the Smirl Coal do not possess aquifer characteristics.

In the proposed permit and adjacent area, Tropic Shale and Dakota Formation provide no baseflow to streams or water from wells. The Applicant has identified one small spring (SP-4; average flow ~1 gpm) that flows from a fault zone in the Dakota and seeps SP-27 (also known as Clampett Spring) and SP-34 that flow from the Dakota Formation in the area just south of the proposed mine (Drawing 7-1). There are no wells in the proposed permit and adjacent area that produce water from the Tropic Shale or Dakota Formation. Mining of the Smirl Coal, at the Tropic – Dakota interface, is not expected to intercept significant volumes of water from these strata nor adversely impact any aquifer below the coal.

The Applicant states that the Dakota Formation is not a good aquifer. Vertical and horizontal ground-water flow in the Dakota Formation is impeded by the presence of low-permeability shales that encase the interbedded, lenticular sandstone strata in the formation, and the natural flow of ground water through the formation is meager, with only minor discharge from the Dakota to springs or streams in the surrounding area. The Tropic Shale that overlies the Dakota limits vertical recharge (Section 624.100; Groundwater).

Slug tests on wells screened in the Smirl Coal Seam indicate relatively low hydraulic conductivity values (Table 7-8). In much of the proposed mining area, the coal seam has been found to be dry. Neither large inflows of ground water from the coal seam into mine workings from the Dakota Formation nor seepage out of mine pits through the coal seam is expected.

The Division received a comment that the boreholes did not extend to the aquifers in the Dakota Formation. The commenter did not identify aquifers or present evidence of aquifers in the Dakota Formation. Neither the Division nor the Applicant has found evidence of aquifers in the strata beneath the Smirl Coal Seam that may be adversely impacted by mining.

Borehole logs in Appendix 6-4 contain representative drill-hole logs depicting the nature, depth and thickness of the coal seam to be mined, rider seams in the overlying strata, and the nature of the Dakota Formation strata immediately below the coal seam to be mined, which meets the requirements of the Coal Mining Rules.

A comment was received that there is no description of the geology that includes any aquifer below the lowest coal seam to be mined, and that samples have not been collected from that aquifer. The Navajo Sandstone aquifer is a regional aquifer that provides ground water of good quality for domestic and agricultural use and to municipal wells. It provides baseflow to springs and streams, and it is the first water-bearing strata underlying the Smirl Coal Seam that can produce appreciable quantities of ground water. The Navajo Sandstone does not crop out in the proposed Coal Hollow Mine permit and adjacent area, is effectively isolated from proposed mining areas by more than 1,000 feet largely low-permeability shales and siltstones of Dakota and Carmel Formations, and is not reasonably expected to be impacted by proposed mining operations. The Navajo Sandstone is described in Sections 621, 624.100, 728.310.

The application contains geologic information in Chapter 6, Appendix 7-1, and other sections of the submittal. This information is not sufficient to assist in determining the PHC of the proposed operation on surface and ground waters in the proposed permit and adjacent areas, determining whether the required reclamation can be achieved, and whether the proposed operation has been designed to prevent material damage to the hydrologic balance in the adjacent area. The Sink Valley Fault and associated Tropic Shale ridge are important features in the surface and subsurface hydrology of Sink Valley Wash. Figure 8 of Appendix 7-7 shows the relationship of the springs, ponds, and streams to the Tropic Shale Ridge and fault and the extent of surface disturbance from excavation of the mine pits. The cross-section on Drawing 7-6 shows the relationship of the pits to the Sink Valley Fault, the Tropic Shale ridge, and the alluvium; however, it does not show the zone of saturation in the alluvium nor the potentiometric surface.

The Applicant submitted Drawings 7-15 and 7-15B and Plates 1 and 2. Drawing 7-15B is a series of five east-west cross sections, approximately 1000 feet apart; the locations are on Drawing 7-15 and Plate 1. The cross sections extend beyond the Permit Boundary to the Sink Valley Wash channel and show the relationship of the proposed mining to the hydrology of the adjacent area. They show the extent of the pits and overburden removal, the location of the Sink Valley Fault and Tropic Shale Ridge, and the general extent and thickness of the coarse sediments where groundwater flow is more likely. Drawing 7-15B also indicates the potentiometric surface, and Plate 2 depicts a Compacted Shale Barrier on cross section E-E'.

As mining progresses to the east, it will encounter the Tropic Shale ridge, a mass of consolidated non-permeable rock forming the west limb of the Sink Valley trough. As mining removes this ridge, it will contact the colluvial sediments that transport ground water to the springs. Several of the springs, which receive their supply of groundwater through the alluvial system are likely to be intercepted by the excavation of the mine pits; however, the recharge area for these springs lies father to the east and will not be disturbed. The supply may be reestablished after the coal is extracted if the mine pits are reconstructed so that the fill that once formed the limb of the trough is reformed and tightly compacted to form a hydrologic barrier. If the fractured shale cannot be adequately compacted, then an impermeable barrier may be required. The spring flow may be reestablished if colluvial sediments are backfilled. Springs may not reestablish in exactly the same place, but the supply source coming from the northeast will continue to deliver flows to the area.

Baseline Cumulative Impact Area Information

The Division has not initiated the CHIA findings document. Information from the permit application will be used along with information from other sources in preparing the CHIA. The Applicant may be required to provide additional information.

Probable Hydrologic Consequences Determination

The Division analyzed surface and groundwater data from the database and PAP to determine that sufficient monitoring information was available to assess the hydrologic regimes, establish seasonal variation, and the potential adverse impacts to the hydrologic balance.

Section 728 contains the PHC Determination, and there is also discussion in Section 724.500. A comment was received that the PHC determination was not based on baseline geologic and hydrologic information "collected for the permit application". The Division finds that there are deficiencies in some of the baseline data and therefore there are deficiencies in the Applicant's PHC determination. The following sections summarize the Applicant's PHC determination and deficiencies identified by the Division.

Potential Adverse Impacts to the Hydrologic Balance (728.310) The application states that information from drilling and aquifer tests indicates that large inflows to the mine pit are not expected; if such inflows develop as mining progresses, the Applicant commits to use techniques such as bentonite- or clay-filled cutoff walls to minimize inflows. Temporary reductions in flow from alluvial aquifers may occur but are likely to be short-lived as the pits will remain open for only 60 to 120 days.

The Division analyzed surface and groundwater data from the database and PAP to determine whether sufficient monitoring information was available to assess the hydrologic regimes, establish seasonal variation, and the potential adverse impacts to the hydrologic balance for the PHC, the Division does not find the data sufficient, see deficiencies written below.

Direct Interception of [Regional] Ground-water Resources

The Applicant has identified that ground-water resources in the Tropic Shale and Dakota Formation are limited and neither the Tropic Shale nor Dakota Formation is a significant source of ground water. Information supporting this conclusion is found in Section 721. Chapter 6 and Appendix 7-1 contain information on the lithology and stratigraphy of the Tropic and Dakota strata. Bore-hole logs in Appendix 6-4 indicate strata overlying and immediately underlying the Smirl Coal do not possess aquifer characteristics. In the proposed permit and adjacent area, these strata provide no baseflow to streams or water from wells. The Applicant has identified one small spring (SP-4; average flow ~1 gpm) and seeps SP-27 (also known as Clampett Spring) and SP-34 that flow from the Dakota Formation in the area just south of the proposed mine (Drawing 7-1). There are no wells in the proposed permit and adjacent area that produce water from the Tropic Shale or Dakota Formation. Mining of the Smirl Coal, at the Tropic – Dakota interface, is not expected to intercept significant volumes of water from these strata nor adversely impact any aquifer below the coal.

A comment was received that there were no contour maps or cross sections depicting seasonal difference in head for aquifers in the Dakota Formation, that there are no water monitoring wells in the Dakota Formation, and that there is no description of the geology that includes any aquifer below the lowest coal seam to be mined. The commenter did not identify an aquifer in the Dakota strata, and neither the Applicant nor the Division has seen any indication of an aquifer or other significant subsurface water resource in the Dakota or Tropic Shale strata, in and adjacent to the coal seam to be mined, that would warrant requiring the mentioned maps and cross sections or requiring the Applicant to install monitoring wells in the Dakota Formation.

The Navajo Sandstone aquifer is a regional aquifer that provides ground water of good quality for domestic and agricultural use and to municipal wells. It provides baseflow to springs and streams and is the first water-bearing stratum underlying the Smirl Coal Seam that can produce appreciable quantities of ground water. It is described in Sections 621, 624.100, 728.310.

The Applicant provides Plate 2 and Figure 19 (App. 7-1) showing the surface water drainages. Three major drainages appear in the vicinity of the proposed mine area: The upper Kanab Creek Drainage, the Sink Valley Drainage and Johnson Wash Drainage. Runoff from Water Canyon, Dry Fork and Lower Robinson Creek drains across the northwest side of the mine permit area. Section 21 Canyon and Swapp Hollow are the recharge source for Sink Valley. The bulk of the groundwater fluxes through the area on the eastern side of the mine. Sink Valley is made up of course grained alluvial and colluvial sediments that transmit the groundwater. Maps of the Sink Valley Drainage, as shown in Figure 21, Appendix 7-1 Drawing 7-4, shows two major locations of alluvial groundwater discharge areas east and southeast of the mine permit area. Figure 7-13 shows the potentiometric level of groundwater in the alluvial/Sink Valley area. In this same map the applicant shows the approximate location of the alluvial groundwater divide between Sink Valley and Lower Robinson Creek drainage.

The coal recovery area is shown on Drawing 5-14. The recovery area follows the approximate location of the fault on the east side of the permit. The drawing shows the coal thickness ranges from 7 feet to the west to 18 feet on the east side of the permit area. Overburden thickness in the coal recovery area ranges from zero the about 200 feet on the east side of the permit boundary near the fault. Most of the coal in the recovery area lies below 140 feet. Drawing 5-16 shows the sequence of mining and extent of the surface disturbance from mine pit development. Plate 5-12 shows the typical cross-section of the mine pit.

The Division received comments that groundwater will be depleted and contaminated when mining takes place. The Division has evaluated the PAP for potential impacts mining will have on the groundwater systems of Lower Robinson Creek and Sink Valley wash.

The first year of mine development will take place in the Robinson Creek drainage. It is expected that the mine will encounter only minor amounts of ground water in the colluvial deposits above the permit area and groundwater trapped in the coal zone. The second and third years will see Pit 2 and Pit 3 developed in the eastern part of the permit. As the mine progresses westward the bottom of the pit will not extend all the way to the permit boundary, but stop at a point where the pit walls, angled at about a 2:1 slope, will extend from the pit floor to the permit boundary. When the pit walls are excavated on the east, mining will mine through the west side of the alluvial trough (Petersen Hydrologic Report Figures 6d, 6e, and 6f Petersen report). This alluvial trough holds and channels groundwater from the drainages to the lower basin of Sink Valley. These cross-sections should be extended westward to include the mine pit, such that an idea of the elevation of the cut and the lowering of the gradient of the groundwater in Sink Valley could be ascertained. The applicant has supplied a discussion how the pit will be reclaimed to restore the groundwater level in Sink Valley.

The Division analyzed surface and groundwater data from the database and PAP to determine that sufficient monitoring information was available to assess the hydrologic regimes, establish seasonal variation, and the potential adverse impacts to the hydrologic balance.

The applicant has described Sink Valley as a large alluvial fan at the foot of the large canyons (Robinson and Swapp Hollow east of Sink Valley. The groundwater flow pattern east of the mine area, is described as having at least two transmissive layers that control flow in Sink Valley, a lower course grained gravel that contains a deep aquifer and an upper finer grained alluvium the hold groundwater but is less transmissive. Groundwater flowing to the upper alluvium from the eastern canyons flows along the the upper surface and discharges as spring (or wet) areas. Sink Valley is separated from the proposed mine area by a shale ridge running northeast to southwest on the eastern side of the proposed mine area. The potentiometric map in Drawing 7-13 show the saturated level of ground in Sink Valley and in the proposed mine area. Drilling conducted by the ACD has confirmed that the material overlying the mine site is stratified shale, siltstone and sandstone layers that do not support an aquifer. No aquifer exists west of the shale ridge.

The applicant identifies two wet areas (Figure 15) on the surface of Sink Valley. A portion of the northern aquifer extends onto the proposed permit area. The applicant identifies these sites as discharge areas of the alluvial fan aquifer (Section 2.1, Peterson Report). Eric Peterson, hydrologic consultant for ACD. Mister Peterson defines the aquifer in the alluvial fan as a continuous interconnected aquifer showing a potentiometric surface as seen in Figures 16a and 16b. The alluvial fan is supplied by runoff that filters into the alluvium from springs and streams of Water Canyon and Swapp Hollow. Well data indicates that there is a more confining layer of sediment in the upper layers and a more course grained layer in the lower areas of Sink Valley. The confining layer appears saturated and contiguous with the lower aquifer. The confining layer ranges from upper Sink Valley to lower Sink Valley above the Jones' property. Water flowing from the canyons infiltrate into the alluvial fan. The amount of water flowing from the canyons has been measured at the springs and in the short channel below, Water Canyon before it infiltrates into the ground. No surface water appears in the lower channels of Water Canyon, Robinson Creek or Swapp Hollow unless it is a very large storm event. The confining acts as an aquitard that supplies springs in the northwest area of Section 29. A deeper aquifer lies below the multi layered aquatard supporting well Y-61. This information is nearly consistant with Paul Andersons Model of the Alluvial Valley Floor Report ,February 1991.

The information indicates the Sink Valley aquifer may be drawn down substantially. As an example, if one looks at cross-secton D-D' in Figure 6e, Petersen Hydrologic Report, December 15, 2008) and imposes the mine pit in relation to the cross-section. The mine pit is expected to be about 110 feet in the area of Well C-3, Drawing 5-15. The mine pit wall angle is about a 2:1 slope, Drawing 5-12. That puts the bottom of the pit 220 feet from the mine permit boundary. As mining removes the western edge of the trough that holds the aquifer, flow from the aquifer will enter the mine. Rough estimates near Well C-3 show the aquifer could be lowered 30 feet, which equates to a large volume of water. When one considers that the Sink Valley aquifer will be mined into almost a mile, groundwater interception could be substantial if the replacement material does not seal the aquifer.

The applicant reports that the mine should not intercept large amounts of water from Sink Valley. However, they have provided a contingency plan in Section 727 to provide an alternative water source. ACD will develop a well on private land, in the north west quarter of Section 29, T39S. R5W. The planned location for the well is lituated within the proposed mine permit area, shown on Drawing 5-8C. The well will produce water from the alluvial groundwater system in Sink Valley. ACD will not use well Y-61. It is believed that adequate water can be produced from the new well to satisfy the potential water replacement needs of the mine.

The information requested for well Y-61 in the last technical review no longer applies, because the information was needed to ensure water right of the well were being protected.

In the submittal of August 27, 2009, the applicant responded to the Division's concerns that the mine workings will intercept groundwater sources from Sink Valley, including springs. They concur that interception of groundwater and springs is likely. ACD proposes techniques to minimize impacts to to the surface and ground water resources. Using well data the applicant identifies the potential extent of course grained alluvium (Plates 1 and 2) that stores and transmits the larger volume of ground water in Sink Valley. Several drill holes and wells extend into the course grained alluvium. Since the water is used for a specific purpose the alluvial zone is designated an aquifer, by definition, R645-301-100. The applicant should be able to replace surface water rights with discharges from the new well. Information provided by the applicant previously mentioned in the review, shows the upper secton of the lower aquifer will be intercepted. There should still be sufficient depth in the aquifer to provide water to well Y-61 for its intended purpose.

The recharge source from the east, Water Canyon and Swapp Hollow, works in favor of supplying the recharge source to the aquifer. The supply of water for the deeper wells should still be available even if the mine intercepts the aquifer, because the aquifer is deeper than the lowest point of mine intersection into the aquifer. Cross-sections on Plate 2 show how the fine grained alluvium and course grained alluvium relate to each other and the mine. Plate 2 shows the mine coming in contact with the course grained alluvium at cross-section E-E'. According to the Applicant's assessment the mine does not contact the course grained aquifer at D-D' , or south of that.point.

The applicant proposes to develop the mine by operating individual mine pits Plate 1. In most cases they will remain open between 60 to 120 days. Mine inflows will be monitored to determine inflow rates. The panel width is runs east-west in the southern part of the mine inflows should be less because the exposes side is less. Greater inflows could occur in the northern part of the permit where panels run north-south. Based on the hydrogeologic conditions ACD will use a suitable technique to minimize groundwater inflow rates to the mine. The applicant has proposed mitigation measures to mine inflows in Appendix 7-9. Plans call for measures to be taken while mining and to install a shale barrier as shown on Plate 2 . If diminution of discharge rates from seeps and springs as a consequence of mining, any lost water will be replaced according to all applicable Utah State laws and regulations.

The recharge source from the east works in favor of still supplying the aquifer. The Division suggests the applicant consider alternatives such as installing wells along the east side of the permit area and pump groundwater back to Sink Valley, to the channel where some flows can be used. It will eliminate flow to the pit where it can become more contaminated. It will also eliminate pumping to Kanab Creek via Robinson Creek.

The recharge source and mitigation barrier should ensure the groundwater flow in Sink Valley is maintained.

Diminution of Downgradient Ground-water Resources

The Applicant has identified that neither the Tropic Shale nor Dakota Sandstone are a significant source of ground water. In the proposed permit and adjacent area, the Dakota Sandstone supports flow from one small fault-related spring and a few seeps that have no associated water rights.

Draining of Upgradient Ground-water Resources

Based on information from water monitoring wells, including slug tests and a pumping and recovery test of Y-61, and analysis of the geology and hydrology of the proposed permit and adjacent area, the Applicant has concluded that the proposed mine plan is designed to minimize potential diminution of flow from the alluvial springs in the proposed permit and adjacent area.

The Applicant notes that after the pump Y-61 was stopped at the end of the 28-hour pumping test, spring discharge rates and water levels in alluvial monitoring wells recovered to approximate pre-test levels. Figure 18 in Appendix 7-1 shows the drawdown and recovery response of four wells (C2-40, C3-40, C4-30, and SS-30) and three springs (SP-20, SP-8, and SP-14). The observation springs were 750 to 1,400 and the wells 1,800 to 4,400 feet from the pumping well. Drawing 7-14 illustrates the drawdown at C2-40 and two other wells, Y-102 and Y-59, which were within 1,000 of Y-61; the Applicant states that drawdowns at more distant wells are too small to show at the scale on this drawing. Figure 17 of Appendix 7-7 illustrates the size and shape of the cone of depression from this pump-drawdown test.

The relationship of the alluvial ground-water table to wells and springs in and adjacent to the NW1/4 of Sec 29 is crucial in understanding the PHC of the proposed mining operation. Figure 18 in Appendix 7-1 indicates that during the pump test on Y-61, water levels actually increased at SP-8 and SS-30 and flow increased at C2-40 after 4 hours of pumping..

If inflows to the mine pits become excessive as mining progresses, the Applicant commits to use techniques such as bentonite~~,~~ or clay-filled cutoff walls to minimize inflows. Temporary reductions in flow from alluvial aquifers may occur but are likely to be short-lived as the pits will remain open for only 60 to 120 days.

Water replacement is discussed in Section 727. Long-term diminution of flow will be replaced with water from a well that has not been drilled yet. The town of Alton has entered into an agreement to transfer a point of diversion for water rights to 50 acre-feet of water, which the Applicant plans to use to satisfy the water replacement requirements: a copy of the agreement with the town of Alton is in Appendix 7-8. The planned new water well, to be constructed on lands currently leased by Alton Coal Development, LLC, will be constructed on lands currently leased by Alton Coal Development, LLC..

Acid and Toxic-forming Materials (728.320)

Appendix 6-2 contains information on the acid- and toxic-forming potential of earth materials naturally present in the proposed permit and adjacent areas. Appendix 6-1 (confidential binder) has information on the Smirl Coal Seam that is proposed for mining. Geochemical data indicate the potential for AMD and toxic drainage is low. Acid- or toxic-forming materials do not appear to be present in the proposed permit and adjacent area in amounts that create a concern, as discussed in Section 728.332. The composite neutralization potential of the overburden and underburden is 180 tons per kiloton, which is almost 33 times the acid potential of 5.5 tons per kiloton, indicating a strong likelihood that acid-mine drainage will not be an issue at the Coal Hollow Mine.

Materials with poor quality SAR, elevated selenium or boron concentrations, or poor pH will not be placed in the upper 4 feet of the reclaimed surface (Chapter 2). See also, selenium monitoring discussion under Reclamation/Hydrology.

Impacts to Important Water-quality Parameters (728.332)

The Applicant does not anticipate discharge of waters from the Tropic Shale or Dakota sandstone. The plan calls for limiting inflow of alluvial waters into the pits, reducing the potential for contamination, mainly from increased TDS concentrations.

In Section 728.333, the Applicant outlines special measures to be taken when mining nears the eastern edge of Pits 13-15, where there is the greatest chance of intercepting large quantities of ground water from the alluvial artesian ground-water system in the NW ¼ of Section 29, T. 5 W., R. 39 S. These measures can minimize the potential for ground-water inflows and deal with them if they occur.

The Applicant anticipates that water will not be discharged from the mine pits. Water in mine pits interferes with the surface mining technique, so keeping water out of the pits is a priority of mine operation. The only likely, foreseeable source of appreciable quantities of ground water is from the alluvial ground-water systems overlying the Tropic Shale. Where possible, ground water encountered in alluvial sediments along the margins of mine pit areas will, as a temporary measure, be intercepted, drained through pipes, ditches or other conveyance methods away from mining areas (Section 728.332, p. 7-35).

The Applicant states that excavation of the alluvial sediments at the eastern edge of the permit boundary in Pits 13, 14, and 15 will proceed incrementally and with caution. If coarse, water-bearing alluvial sediments are encountered, the equipment operators will stop overburden removal and cover the exposed gravels with available impermeable alluvial material (Tropic Shale) to, if possible, halt ground-water inflow. A hydrogeologist will be called to the site to assess the conditions (Section 728.333, p. 7-28). Prior to the resumption of overburden removal, the Applicant will develop a suitable work plan, designed to minimize the potential for intercepting unacceptably large inflows of ground water into the mine pits. The work plan may include such measures as trenching and emplacement of a low-permeability cut-off wall to isolate the mine openings from the coarse-grained alluvial ground-water system, with the object of minimizing the potential for detrimental impacts to the hydrologic balance and the potential for flooding of mine pits and causing flooding or stream alteration thought the discharge of large volumes of water.

The Applicant states that where possible, ground water encountered in alluvial sediments along the margins of mine pit areas will, as a temporary measure, be intercepted, drained through pipes, ditches or other conveyance methods away from mining areas (Section 728.332, p. 7-35). This will prevent or minimize the potential for interaction with sediments disturbed by mining operations, including contact with the mined coal seam. These intercepted alluvial ground waters would be routed into Pond 4, which has a storage capacity of 7.5 acre-ft, 1.8 acre-ft more than required, and an emergency discharge structure (Section 728.333). Design parameters for Pond 4 are in Appendix 5-2. The Applicant does not have a UPDES permit, but commits that any discharges from the mine will be done under a UPDES permit (Section 728.333).

Sedimentation ponds and other sediment control methods will minimize erosion from disturbed areas and control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area.

The Applicant commits to using spill control kits on all equipment to minimize contamination from spillage of hydrocarbons, and that the site will have a SPCC plan (Section 728.322).

The Applicant states that as ground water migrates through the shallow, fine-grained alluvial sediments in the proposed Coal Hollow Mine permit and adjacent area (most notably in Sink Valley), the quality of the water is naturally degraded: Appendix 7-1 is referenced for this information. Drawing 7-5 shows that specific conductance of the water increases downgradient. Stiff diagrams for selected springs, shown on Figure 14 of Appendix 7-1, indicate a downgradient evolution from calcium-magnesium-bicarbonate type waters toward waters with greater portions of sodium, potassium, magnesium, and sulfate and increased TDS.

In Section 728.333, the Applicant outlines special measures to be taken when mining nears the eastern edge of Pits 13-15, where there is the greatest chance of intercepting large quantities of ground water from the alluvial artesian ground-water system in the NW ¼ of Section 29, T. 5 W., R. 39 S. Appendix 7-9 provides more of the details in this Contingency Plan. These measures can minimize the potential for ground-water inflows and deal with them if they occur.

The application states that pumping and discharging of mine water from mine pits at the proposed Coal Hollow Mine permit area is not anticipated. If excessive quantities of water, from any source, were to flow into the pits, the Applicant commits that water is to be pumped from the pits using suitable equipment that will be kept on-site. The water will be managed in compliance with applicable State and federal regulations. The Applicant emphasizes that flooding of the pit would hinder mine operations and it will be in their best interest to take all reasonable efforts to minimize the potential for flooding of the mine pits (Section 728.333).

Historically, flooding of pit mines by heavy precipitation is a known occurrence; however, because the Coal Hollow Mine has been designed to fully contain surface runoff from a 100-year, 24-hour precipitation event, with an additional capacity for a margin of safety; the potential for actual flooding of the mine pits from storm runoff is very unlikely.

<u>Flooding or Streamflow Alteration</u> (728.333)

The Applicant asserts in Section 728.333 that the reasonably foreseeable mine discharge of several hundred gpm and the maximum anticipated alluvial ground-water discharge to Sink Valley Wash or Lower Robinson Creek are much less than the flows occurring periodically in those drainages during torrential precipitation events, and will likely not be sufficient to potentially cause flooding or stream flow alteration in either drainage. The addition of modest amounts of sediment-free water into these stream channels has the potential to cause minor increases in channel erosion; however, the magnitude of this potential impact will likely be small relative to the erosion and sedimentation occurring during torrential precipitation events.

Based on the estimated mine pit ground-water inflow rates in Table 7-9, the Applicant considers it likely that mine interception will be on the order of a few tens of gpm (dry areas; small pit size) to several hundred gpm (wetter areas; large pit size). In most instances, individual mine pits in will remain open for no more than about 60 to 120 days, minimizing inflow (Sections 724.500 and 728.310, p. 7-31). The Applicant stated that if substantial ground water flowed into the mine a study would be conducted to mitigate the flow. The Applicant has provided a series of cross-sections showing how the mine would intercept the Sink Valley trough. The Applicant has shown the estimated elevation where the mine will contact the Sink Valley trough and the amount of flow expected while the pit is open.

The Applicant states in Section 728.333 that lower Sink Valley Wash (below the County Road 136 crossing), Lower Robinson Creek, and Kanab Creek have large discharge capacities and periodically convey large volumes of runoff: The Division's database contains flow data from these streams back to 1987. The data show that, although Kanab Creek, Sink Valley Wash, and Robinson Creek are typically dry, flows of several hundred gpm - and on occasion thousands of gpm - occur periodically. The maximum flow reported for Kanab Creek is 6,283 (14 cfs) at SW-2 (above the confluence with Lower Robinson Creek) on 2/11/1988; a more recent high flow of 4,170 gpm (9 cfs) occurred on Kanab Creek at SW-3 (below the confluence with Lower Robinson Creek) on 03/22/2008.

The Applicant finds it noteworthy that the principle surface drainages in and adjacent to the proposed Coal Hollow Mine permit area, i.e., Lower Robinson and Kanab Creeks and their tributaries, are in many locations not stable in their current configurations, and are actively eroding their channels during precipitation events. This results in down-cutting and entrenchment of stream channels, the formation of unstable near-vertical erosional escarpments adjacent to stream channels that occasionally spall off into the stream channel, aggressive headward erosion of stream channels and side tributaries, and the transport of large quantities of sediment associated with torrential precipitation events. These processes appear to be migrating upstream, resulting in increasing lengths of unstable stream channels. The Applicant cites researchers who propose that although the creation of the numerous arroyos currently in existence in the southwestern United States is not completely understood, the effect may have been magnified by the temporal coincidence of several factors: 1) valley fill alluviation in the southern Colorado Plateau occurred during a long-term decrease in the frequency of large, destructive floods, which ended in about 1880 with the beginning of the historic arroyo cutting; 2) the shift from deposition to valley entrenchment coincided with the beginning of an episode of the largest floods in the preceding 400-500 years, which was probably caused by an increased recurrence and intensity of flood-producing El Nino Southern Oscillation events beginning around 1870; 3) land-use practices such as livestock grazing, and 4) natural cycles of erosion and deposition caused by internal adjustments to the channel system. The Applicant cites historical evidence that the cutting of Kanab Creek began with a large storm on 29 July 1883, followed by unusually large amounts of precipitation in 1884-85, and that during this period, the Kanab Creek channel was down-cut by 60 feet and widened by 70 feet over a distance of about 15 miles: the lowering of Kanab Creek may have resulted in a lowering of the local base level and consequent incision of both Sink Valley Wash and Lower Robinson Creek. Heavy livestock grazing likely contributed to the stream down-cutting episode in the late 1800s. The Applicant proposes that the Coal Hollow Mine MRP is designed to minimize the potential for sediment yield and erosion and consequently for stream channel erosion and instability; no mining-related activities are planned that would likely increase current instability of the surface water drainages in the permit and adjacent area (Section 728.333).

The application states in Section 728.333 that most precipitation runoff on disturbed areas will be contained in diversion ditches and routed to sedimentation impoundments. Sediment control facilities will be geotechnically stable, minimizing the potential for breaches, which can result in down-stream flooding and increased erosion and sediment yield. Emergency spillways will provide a non-destructive discharge route from the impoundments, if needed.

In the proposed mining plan, Lower Robinson Creek is to be diverted temporarily. Appendix 5-3, prepared by Dr. James E. Nelson, Assistant Professor, Civil and Environmental Engineering at BYU, contains the analysis and specifications for this diversion, and Drawings 5-20 and 5-21A show design details for the construction and reclamation of this channel. The resulting temporary channel will have straight reaches and three sharp bends - including two 90° bends - and will require extensive rip-rap. The reclaimed channel will be in approximately the same location as the current channel; however, instead of restoring the channel to its current configuration, with an entrenched channel and steep embankments, the Applicant proposes a sinuous channel, flanked by a narrow flood plain, with banks laid back at a more gentle angle.

Ground Water and Surface Water Availability (728.334)

Water rights are shown on Drawing 7-3 and listed in Appendix 7-3. (The spring designations on Drawing 7-3 do not match those on other maps; the Applicant has been asked to rectify this confusing discrepancy, see R645-301-121.200 and R645-301-720). Domestic water for the Swapp and Sorenson Ranches comes from alluvial springs. Spring SP-8 (water right 85-363) supplies the Swapp Ranch, but the water right doesn't designate domestic use. Sorensen's water right 85-373 (SP-3) is for both stockwatering and domestic use. Pugh's water right 85-215 (SP-7) is located right along the fence between Pugh's and Dame's properties and is the only domestic water right within the proposed permit area. Spring SP-10B (water right 85-1011), south of the proposed permit area, supplies domestic water for the Johnson family.

Alluvial springs have provided limited irrigation water for home gardens and fruit trees in areas adjacent to the proposed Coal Hollow Mine permit area (Drawing 7-7), but other than some current yard irrigation at the Swapp Ranch house, these lands have not been irrigated for over 10 years (Personal communication, Burton Pugh, 2008; Richard Dame, 2007). The.Pughs and Dames own both the coal that will be mined and the overlying surface, as shown on Drawings 1-3 and 1-4.

Mr. Sorensen has used runoff from the adjacent Paunsaugunt Plateau for flood irrigation for hay or grain on lands east of the proposed Coal Hollow permit area (Chapter 4, Exhibit 4-1 and Drawings 1-3, 1-5, 1-6, and 3-1). Based on personal communication between Mr. Sorensen and the Applicant, this irrigation typically has been a single application in the spring and is largely limited to years with appreciable precipitation and stream runoff: with the exception of 2005, water has not been sufficient for flood irrigation in recent years. Source areas for these waters are topographically and stratigraphically upgradient of and distant from the proposed Coal Hollow Mine, and surface- and ground waters from these areas will not be impacted by the proposed mining activities (Section 721; Appendix 7-7, Section 4.1).

The Applicant estimates State appropriated water supplies to be approximately 35 gpm in Alluvial Groundwater Discharge Area A and 17 gpm in Area B (Section 727; Drawings 7-3 and 7-4; Appendix 7-3), so in a worst-case scenario, the Applicant would be required to replace approximately 52 gpm of state appropriated water rights. The Applicant states that the proposed water well in Section 29, T. 39 S., R. 5 W. will be designed to produce water sufficient to meet that demand, and further that the aquifer analysis in Appendix 7-1 suggests that the yield of the alluvial ground-water system should be capable of sustaining discharges of the duration and volume likely needed to replace the water. The Applicant notes that the likely duration will be relatively short (Section 728).

The Applicant has entered into a written agreement with the town of Alton, Utah to transfer the point of diversion for 50 acre-feet of water for use at the Coal Hollow Mine. A copy of this agreement is included in Appendix 7-8

Under Direct Interception of Groundwater Resources *(p. 7-25)*, the Applicant states:

"Alluvial groundwater systems in planned mining areas in the proposed Coal Hollow Mine permit area will be directly intercepted by the mine openings. It is not anticipated that the direct interception of shallow alluvial groundwater will adversely impact the overall hydrologic balance in the region. This is because no springs, seeps or other important groundwater resources have been identified in proposed mine pit areas (Drawing 7-1). In the pre-mining condition, any diffuse groundwater discharge to the ground surface that occurs is primarily lost to evapotranspiration and does not contribute appreciably to the overall hydrologic balance in the area."

This addresses ground water that supplies springs and seeps but seems to ignore the importance of subirrigation to what is possibly an adjacent AVF and dismisses the impact that direct interception of ground water in the alluvial aquifer would have on the moisture held in the soils and the essential hydrologic function of the adjacent, potential AVF.

Reference is made to Drawing 7-1, which shows the seep and spring locations; however, the Application needs a single map that shows the extent of the pits – including the extent of overburden removal (Drawing 5-16), the location of the fault and Tropic Shale Ridge (Drawing 7-12), the location of the seeps and springs (Drawing 7-1), and the Alluvial Discharge Areas (Drawing 7-4). Such a map doesn't need to show the entire permit area, but rather should center on Pit 15, where the features of interest are proximate and the possibility of impacting the hydrologic balance and the essential hydrologic function of what is possibly an AVF is greatest (see deficiency written under R645-301-624, -724).

Water replacement is discussed in Section 727. Long-term diminution of flow will be replaced with water from a well that has not been drilled yet. The town of Alton has entered into an agreement to transfer a point of diversion for water rights to 50 acre-feet of water, which the Applicant plans to use to satisfy the water replacement requirements: a copy of the agreement is in Appendix 7-8. The planned new water well will be constructed on lands currently leased by Alton Coal Development, LLC. It is not clear if this new well will be the water-supply for the mine, or for water-replacement only (see deficiency written under R645-301-731.530, p. 126 of the TA).

The Applicant concludes that there is essentially no probability that surface water in the Sink Valley Wash drainage could become unavailable as a result of the proposed mining and reclamation activities: the surface waters originate from up-gradient areas that are located large distances from the proposed mining, and the stream channels are entirely outside the area to be disturbed by mining and reclamation activities. The application states that in the Sink Valley Wash drainage, surface-water flows in Water Canyon and Swapp Hollow are used for stock watering and limited irrigation: Drawing 7-3 shows there are water rights for surface point-of-diversion and point-to-point diversions along Sink Valley Wash but none in the two mentioned tributary drainages. (Monitoring at point SW-8 in Swapp Hollow has consistently noted flow in this channel.) The application also states that below Section 29 T. 39 S., R. 5 W., Sink Valley Wash usually has no appreciable discharge: there are point-to-point and surface point-of-diversion water rights in Sink Valley Wash below Section 29 (Drawing 7-3).

The application indicates Lower Robinson Creek immediately above the proposed permit area typically discharges only in direct response to precipitation or snowmelt, so surface-water availability is limited. Ground water seeps from the alluvium into the deeply incised stream channel near the exposed Dakota-alluvium contact in the bottom of the stream channel, in the SE¼, Section 19, T. 39 S., R. 5 W. (the Applicant considers it noteworthy that the location of this discharge has varied somewhat over time, but offers no further comment on the possible significance of this observation). This seepage, monitored at SW-5 (Drawing 7-2), is characterized as usually 5 - 10 gpm or less: significantly larger flows, as great as 410 gpm, have been reported at this site (Division's database), although such large flows are presumed to be runoff – the database does not distinguish seepage from runoff.

Surface-Water Monitoring Plan

The protocol for baseline and operational surface-water monitoring is in Tables 7-4 through 7-6B. Drawing 7-2 shows baseline monitoring locations except for BLM-1 (BLM-1 is shown on Drawing 7-10). Section 724.200 discusses baseline surface-water monitoring; three paragraphs at the end of Section 724.200 describe baseline surface-water monitoring sites. As shown on Drawing 7-3, SW-18 is on an ephemeral wash located over a mile outside the permit area, and the Applicant has not observed any discharge at SW-18 during monitoring: SW-18 is not included in Table 7-5 because it is not proposed for operational monitoring, and SW-18 is not in the Division's database. Discrepancies between Section 724.200, Drawing 7-2, and Table 7-5, shown in the following table, need to be resolved (see deficiency written under R645-301-724.200 and -121.200).

Baseline Monitoring Sites	Described in Section 724.200	Listed in Table 7-5	Shown on Drawing 7-2	Data in Database
SW-1	√		√	√
SW-2	√	√	√	√
SW-3	√	√	√	√
SW-4	√	√	√	√
SW-5	√	√	√	√
SW-6	√	√	√	√
SW-7	√		√	√
SW-8	√	√	√	√
SW-9	√	√	√	√
SW-10			√	√
SW-18			√	
SW-101	√	√	√	√
BLM-1		√	(Drawing 7-10)	√
RID-1	√	√	√	√
Lamb Canal			√	√

The Applicant will apply for a UPDES permit to discharge from the mine pit, to either Lower Robinson Creek or Sink Valley Wash, which are both tributary to Kanab Creek.

Findings:

Hydrologic Resource Information meets the requirements of the Coal Mining Rules. However the following clear and concise issues should be resolved at the earliest opportunity:

- Strike and dip are not evident on Drawings 6-1 and 6-6 (see statement in Section 622.300). Clearly indicate strike and dip on Drawings 6-1 and 6-6, or if strike and dip are shown on other maps, correct the reference in Section 622.30. R645 - 301- 622.300 requires strike and dip be shown on a map.

- Add Drawings 15 and 15B to the Table of Contents for Chapter 7.

- Add information on surface-water monitoring points SVWOBS-1 and SVWOBS-2 to Section 724.200 and appropriate maps.

- Clarify that silt fencing treating runoff from Watershed 6 will be placed on the upslope or east side of the relocated channel, rather than on the downslope or west side as indicated on Drawing 5-26.

- Update Section 731.600 Stream Buffer Zones to include "ephemeral streams that drain a watershed of at least one square mile" (R645-301-731.600 was reworded after the Applicant's initial submittal).

MAPS, PLANS, AND CROSS SECTIONS OF RESOURCE INFORMATION

Regulatory Reference: 30 CFR 783.24, 783.25; R645-301-323, -301-411, -301-521, -301-622, -301-722, -301-731.

Analysis:

Affected Area Boundary Maps

In response to Task 2910 deficiency: R645-301-521, the Applicant re-created the following maps to utilize the following R645 Coal Mining Rules terminology, "permit boundary" and "permit area":

Drawings 1-1 through 1-4
Drawing 2-2
Drawing 3-1 through 3-6
Drawing 5-1, 5-2, 5-3, 5-9, 5-10, 5-13, 5-14, 5-15, 5-16, 5-16, 5-17, 5-18, 5-19, 5-20, 5-21, 5-22, 5-23, 5-25, 5-26, 5-27, 5-33, 5-34, 5-35, 5-36, 5-37, 5-38, 5-39
Drawings 6-1, 6-2, 6-5, 6-9
Plates 3 and 4 of the AVF Report
Drawings 7-1, 7-2, 7-3, 7-10, 7-12.

The Applicant has also identified land leased from C. Burton Pugh, which lies outside of the Coal Hollow permit boundary. The leased acreage is identified on Drawing 1-3; the Applicant's interest is declared on Page 1-6, Chapter 1, Volume 1. Some private ownership remains on the southeast side of the proposed permit area (See Dwg. 1-4, Coal Ownership).

The Applicant states that there are no other areas outside of the proposed permit boundary which are under the exclusive control Alton Coal Development.